

Utah State University

DigitalCommons@USU

Funded Research Records

8-4-2020

NSF Engineering Research Center for Advancing Sustainability through Powered Infrastructure for Roadway Electrification (ASPIRE)

Zane Regan
regan.zane@usu.edu

Follow this and additional works at: https://digitalcommons.usu.edu/funded_research_data



Part of the [Computer Engineering Commons](#)

Recommended Citation

Zane, R. (2020). NSF Engineering Research Center for Advancing Sustainability through Powered Infrastructure for Roadway Electrification (ASPIRE). Utah State University. <https://doi.org/10.26078/MKXX-3V61>

This Grant Record is brought to you for free and open access by DigitalCommons@USU. It has been accepted for inclusion in Funded Research Records by an authorized administrator of DigitalCommons@USU. For more information, please contact digitalcommons@usu.edu.



ASPIRE Data Management Plan

This Data Management Plan addresses NSF's policy on the dissemination and sharing of research results within a reasonable time. In accordance with this policy, this plan does not include preliminary analyses, drafts of scientific papers, plans for future research, peer reviews, or communication with colleagues. Furthermore, data to enable peer review and publication/dissemination and/or to protect intellectual property may be temporarily withheld from distribution and other proposed data management. This plan will make certain that the data produced during the period of this ERC is appropriately managed to ensure its usability, accessibility, and preservation. The ERC team has a strong track record with timely scientific publications and adherence to NSF's Data Management policy.

Expected Data

The proposed engineered system consists of a ubiquitous network of standardized plug-in and wireless charging solutions that is seamlessly integrated into the transportation and grid infrastructure, interoperable across all vehicle classes, and cloud connected with distributed controls to minimize cost and emissions. Besides data that are publicly available on the Web, various types of data will be collected throughout the course of this ERC. Specifically, we expect to generate the following data and software:

(1) We will collect large amounts of data that are relevant to transportation electrification, including charging systems, power grids, transportation infrastructure, traffic data, weather/road conditions, individual and fleets of vehicles, government policies, consumers' driving needs and preferences, as well as potential impacts on economic, environmental, and social sustainability.

(2) The data we collect above may include raw sensor data and configurations regarding specific experiments and simulations, as well as user studies and survey data. The data may require transformation and further processing, in which case both the original data and processed data will be retained, along with metadata that document the processing steps and software.

(3) Detailed data regarding the electronic and mechanical designs and specifications, roadway materials fabrication methods, design and development of computer software for data analysis, (sub-)system modeling, communication, control and optimization, as well as the implementation, integration, and evaluation of all proposed components will be collected and retained.

(4) Results generated by this ERC will be published at various scientific venues and integrated into curriculum and other educational materials. Such data, in the form of scientific publications and educational materials, will also be retained.

Period of Data Retention

Data generated by the ERC will be retained for at least three years post-award or three years after public release, whichever is later. Data may be retained longer as required by patent applications, agreements with industry partners, or other contractual agreements. In addition, given the particular value and wide community interest, we will make an effort to release them publicly as soon as possible and retain such data for as long as possible. We expect to be able to retain the data and analysis results for five to ten years post project completion. We will also explore partnerships with interested parties to retain data for longer term. To ensure timely public release of research data, we will seek scientific submission in top conferences and journals in one or two months of obtaining research results. Counting the review process and publication latency, we expect to publish results within one year. All publications will be reviewed by the participating universities' Intellectual Property Services Offices to ensure that proprietary information is not disclosed and that publication at that point in time does not diminish potential patent and IP rights. When IP protection has been secured, the ERC team, including industry partners, will be encouraged to publish information as soon as possible consistent with commercialization strategies.

Data Formats and Dissemination

Data will be recorded and stored in the format prescribed by the generating university's Good Laboratory Practices (e.g., the use of notebooks, witnessing of results). Electronic and mechanical designs

will be stored digitally in the software's native format (with paper copies where practical). The software we create/collect in this project, including source code and binary files, will be recorded in standard format depending on the programming language used, such as C/C++, Java, Python, R, and MATLAB. Raw data and processed data may be available in different database formats and converted to other formats as needed (e.g., Microsoft Azure SQL Database, Google Cloud SQL). Other data will be stored as text files, csv files, image files, etc. Some processed data may be stored as Microsoft Excel spreadsheet files, and descriptions will be stored as Microsoft Word, Latex, HTML files, or presentation slides.

For the proposed ERC, a dedicated project server as well as the Google or Amazon cloud service platform will serve as the code and document repository, data storage hub, data analysis, and ERC web server. All research papers and curriculum materials produced from this project will be disseminated via a dedicated ERC website hosted by the team. The software produced as part of the ERC will be written under an open source license and will be made publicly available for download, along with some online simulation support. The distance education technologies developed and used extensively by USU and UCB will be used to enhance data sharing, especially of educational materials.

Most of the data collected and studied in this ERC can be made publicly available without additional requirements stipulated by the funding or the participating universities. The data will be classified as publishable data, which we have processed for easier understanding and reuse, and intermediate results, which require extra effort to parse. Some community- or user-specific data may be sensitive and require careful anonymization and aggregation before they can be shared publicly. Some other data may be restricted, e.g., data of a proprietary nature that are required to support patent applications or are otherwise deemed as proprietary by reason of contracts between the ERC and private companies.

Data Storage and Preservation of Access

The ERC team's experience with, and commitment to, secure data archiving is well established and is in keeping with information security policies established by the participating universities. While most of the data are publicly available, any user-sensitive or proprietary data collected as part of this project will be stored securely, and only authorized project personnel will have login permission to access such data. Data regarding user surveys/focus groups/interviews will be stored according to IRB standards. They will not include identifiable information with which human subjects can be directly linked and associated. No disclosure of the subjects' responses outside the research could place the human subjects at risk of damaging their financial standing, employability, insurability, or reputation. Furthermore, the participants will not include children; all respondents will be adult residents of the case study cities. Human subjects will be protected from research risks in conformance with the relevant Federal policy known as the Common Rule (Federal Policy for the Protection of Human Subjects, 45 CFR 690). The data will be encrypted as needed. Administrative access to the cloud servers and their associated virtual machines is password-protected and will be restricted to authorized project personnel only. Verified user accounts and proper access control will be used to guard third-party access to non-public data.

Roles, Responsibilities, and Resources

The Thrust area leaders will be responsible for overseeing data management and dissemination among project members and teams within their respective Thrust areas. A data manager who is knowledgeable of the various datasets within the ERC will be responsible for data management and dissemination, both internally and externally. They will be jointly supported by a systems engineer who manages the EVR facility and oversees the ERC integrated hardware demonstrations, and a software engineer who develops the city-scale and inter-city simulation testbed. The ERC team will have ready access to data management expertise within the ERC, research computing support among the participating universities, cloud computing services, as well as the Space Dynamics Laboratory (close to EVR) and NCAR's Research Applications Laboratory, which have decades of experience in developing, documenting, and managing data for complex space, defense, weather, energy systems, and transportation systems.